Water Use and Availability in New Jersey

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Water Use and Availability

- **Water Use**
  - NJ Water-Tracking Data Model (NJWaTr): tool for storing and analyzing NJ’s water use data

- **Water Availability**
  - Water-Table Aquifer Systems
    - Stream Low Flow Margin (HUC11)
    - Eco-Flow Goals or NJ Hydroecological Integrity Assessment Process
  - Confined Aquifers
    - Groundwater modeling
  - Reservoir Safe Yield
  - Administratively approved
NJWaTr can help determine...

- Where does our water come from?
- Where is it being used?
- What is the water used for?
- How much is used?
- Who’s using it?
- Where does it go?
- How do these facts change over time?
Simple questions, but

- Water programs established to address very specific needs with specific rules and regulations.
  - e.g. water allocation, safe drinking water, NJDPES, WQMPs
- The data management systems of those programs were designed to manage each program’s specific data needs, not the entire cycle of water use.
- NJWaTr links these different datasets together to allow the user to look at the conveyance of water from withdrawal to discharge.
What is NJWaTr...

- A conveyance-based data model (MS Access) that represents any water exchange activity between two sites.
- Pairs of Sites are joined through unidirectional Conveyances for which water Transfers are recorded.
- Sites and conveyances form a water network.
- Attributes such as owner, permit, water resource, location are linked with each component of the network.
- Developed with USGS in 2003.
Two Primary Water Networks in NJWaTr

self-supplied commercial and industrial, agricultural, power generation, irrigation and mining uses

Potable supply and wastewater
NJWaTr Contains

- Sites
  - Over 25,000 withdrawal points, use areas, collection areas and discharge points

- Conveyances
  - 26,000 one-way conveyances between sites

- Transfer Volumes
  - 1990 to 1999 monthly data
  - 760,000 transfers
  - resource withdrawals, bulk transfers, and sewer discharges

- 2000 to 2007 data will be available summer ’09

- Flexible design allows easy addition of new data/attributes
NJWaTr can help determine...

- Where does our water come from?
- Where is it being used?
- What is the water used for?
- How much is used?
- Who’s using it?
- Where does it go?
- How do these facts change over time?
Where does water come?

Statewide Annual Source of Water

1990s averages: surface water = 75%, unconfined gw = 18%, confined gw = 7%
How is water used?
1990-1999 Statewide Average Water Use

Total Use = 945 billion gallons per year
= 2.5 billion gallons per day

- Agricultural: 45%
- Commercial: 37%
- Industrial: 8%
- Potable supply: 6%
- Irrigation: 4%
- Mining: 0.4%
- Power generation: 0.1%
Does use vary by region or over time?

Potable Supply Water Use by WMA

- Barnegat Bay
- Upper Passaic

Linear (Barnegat Bay)  
Linear (Upper Passaic)
Are there seasonal use trends?

Monthly Potable Water Use for Barnegat Bay WMA

![Bar chart showing monthly potable water use from Jan-90 to Jan-99. The chart compares non-consumptive and consumptive use. Peaks are observed in certain months, indicating seasonal trends.](chart.png)
HUC11 Water Use Publication: www.nj.gov/dep/njgs/enviroed/HUC11.htm
Watershed Water Accounting
(a.k.a. depletive and consumptive analysis)

For the Upper Rancocas Watershed
Stream Low Flow Margin for water-table aquifer systems

- Considers only net depletive and consumptive loss to a HUC11 – (NJWaTr analysis)
- Defines availability as 25% of the difference between September median flow (normal low flow) and 7Q10 (drought flow) for a HUC11
- Eco-flow goals pilot studies used to arrive at the 25% threshold
Example Daily Hydrograph with September Median and 7Q10 Flows
Hydroecological Integrity Assessment Process

- based on the “natural flow paradigm” which assumes that the ecology of a stream has evolved based on the full range of natural streamflow
- quantitatively characterizes (stream flow statistics) baseline or un-impacted natural streamflow
- used to determine if current and/or future changes to streamflow are too much (changes statistics too much).
Monthly Low Flow
1 of 20 statistics analyzed

Monthly Low Flows
Median (50%) of baseline & scenarios
compared to 25% - 40% - 60% - 75% baseline variability

CFS
20
15
10
5
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
25% 40% 60% 75% baseline 10xDC100
10 Pilot Study Watersheds

**Key**
- Water Regions
- NJ Counties

**HIP Pilot Study Watersheds**
- Batsto River at Batsto
- Flat Brook near Flatbrookville
- Great Egg Harbor River at Folsom
- Lamington River near Pottersville
- Mulhockaway Creek at Van Syckel
- Mullica River near Batsto
- N. Branch Rancocas near Pemberton
- Neshanic River near Reaville
- Toms River near Toms River
- West Brook near Wanaque

![Map of New Jersey showing pilot study watersheds](image)
September Depletive and Consumptive Loss by HUC11

1990 to 1990 peak loss
Excludes reservoirs and confined aquifers

Full allocation loss

Primary Cause of Depletive and Consumptive Loss

1990 to 1990 peak loss

Full allocation loss

1990 to 1990 peak loss

Full allocation loss
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